TEXAS AGRICULTURAL EXPERIMENT STATION

AGRICULTURAL AND MECHANICAL COLLEGE OF TEXAS

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BUREAU OF MYCOLOGY
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THIRTY-SIXTH ANNUAL REPORT

1923

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†As of October 1, 1928.
*In cooperation with School of Veterinary Medicine, A. and M. College of Texas.
**In cooperation with United States Department of Agriculture.

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THIRTY-SIXTH ANNUAL REPORT 1923

B. Youngblood, Director

INTRODUCTION

The Thirty-sixth Annual Report of the Texas Agricultural Experiment Station System of the Agricultural and Mechanical College of Texas, for the fiscal year beginning September 1, 1922, and ending August 31, 1923, is presented herewith.

The Texas Station System comprises a Main Station at College Station, consisting of 12 separate divisions of work with the necessary offices and appropriate laboratories for scientific research, and 13 substations, or experiment farms, located in as many agricultural regions of the State. In addition, there is the State Apicultural Research Laboratory near San Antonio; a queen-rearing yard also near San Antonio; and three bee research outyards at Dilley, Roxton, and Seguin.

Nature of Research

It is important that the nature of agricultural research should be understood by every one. In the first place, research should be established on a basis of permanency, inasmuch as civilization has advanced only through knowledge and so will agriculture advance through knowledge scientifically gained from the study of agricultural problems and resources. Temporary research is an admission of only a partial solution of the problem, and it is well known that as economic and other conditions change, new and complex problems arise. It would seem, therefore, that our research should be established on a basis of constant and continuous searching after facts, and that there should be a tendency on the part of the people to encourage research and to provide for its conduct in advance of the time when the information is actually needed. In this way, and in this way only, can research adequately fill its place and properly serve the people. Such a permanent research agency can be maintained only on lands permanently owned and permanently devoted to research purposes. Rented or leased lands, over which the research agency has only temporary control, contribute to temporary work—a type of research that is, as a rule, highly expensive and wasteful in that it is likely never to be brought to the most useful conclusions.

Project System Employed

In the conduct of its research, the Station System employs a very definite system of projects. The value of this project system lies in its adaptation for directing research into the channels of greatest importance when the agricultural development of the State is considered. Moreover, the use of the project system tends to cause the research workers to adopt sys-

tematic methods of investigation. Mere investigation, without systematic effort in the collection and analysis of data, is likely to be inefficient and lacking in reliability. It should be emphasized that the very basis of research is accuracy and reliability of both data and conclusions, and to this end it is felt that the project system can be relied upon as insuring a safe basis for investigation. As a matter of fact, the project system is now generally used by all of the better research agencies.

During the year, the Station System had 72 active projects, each led by a worker who is a specialist in the particular field in which the study falls. Above all, the leader must familiarize himself with what has previously been done in the way of investigation relating to the project at hand, by investigators throughout the world, in order that he may not dissipate any of his time upon phases of the problem which have been solved by others. A necessary requirement of each and every project is that it refers to a specific line of investigation, so as to avoid too broad an assignment of effort to a given leader. This insures concentration of effort upon specific objectives and avoids "scatteration" and loss of the investigator's time. Realizing that each project has a special relation to agriculture in general, it is the policy of the Station System to coordinate the different investigations in such a manner that either one or several studies may be a contributing agency to one or more of our major problems in agriculture. For example, the study of Texas root rot involves not only the project of the plant pathologist and physiologist, but also some of the projects of the agronomist insofar as methods may be used in bringing about the curtailment of host plants other than cotton which harbor the disease. Likewise, it might involve physiological relations in the soil, and might also be affected, to some extent at least, by the chemical composition of the soil.

It will be seen, therefore, that limitation of the number of projects is a very important matter from the standpoint of keeping the investigations within the bounds of available facilities, and that coordination is important in assembling full and complete data relating to important control measures.

Permanent Scientific Records

The plan in use by the Station System involves the permanent recording of research. Each division and substation perpares and files, for a permanent record, a detailed report of its work each year. These reports, which are not for publication, are the storehouses of the information secured until a sufficient amount is accumulated on any phase of the work to justify definite conclusions, at which time the information is taken from the storehouse and put into proper form for publication, setting forth not only the original data, but also the definite conclusions derived therefrom. It is obvious that there is much reserve information assembled in these unpublished annual reports, though it is not of value to the public until a sufficient amount is accumulated to justify accurate conclusions.

The annual reports submitted by the divisions and substations for file

as permanent records usually contain from 200 to 300 pages each of typewritten matter, much of which is tabular material, as compared with 50 to 60 pages in the more comprehensive reports made in earlier days of the Station's history.

Relations with Other Agencies

The relations of the Station System with the workers maintained in the State by the United States Department of Agriculture have been very cordial, as a rule. It is generally the policy of the Federal authorities, when working in Texas, to devote their activities to problems of national scope rather than to those of a regional nature.

It is the fixed policy of the System, however, to render service to any and all agricultural agencies in any way engaged in the advancement of agriculture, directly or by the dissemination of information.

Business Methods

The policy of the Station System is to employ business methods which will uphold the public policy by safeguarding all funds from over-expenditure, extravagance, and waste in every form, without unnecessary red-tape or loss of time. The Chief Clerk and all the Substation Superintendents and other officers handling funds and property are under indemnity bonds of appropriate amounts. All sales of products or property are receipted for in triplicate, the original receipt (numbered and registered) going to the purchaser, the duplicate being transmitted to the central office along with the money and the triplicate retained by the seller, so that there is an absolute check on everything sold, and on all funds received by all officers and employees.

The following is an outline of the fiscal system used:

The funds are apportioned or allotted and carefully checked from time to time to prevent the possibility of overrun in any item or account.

No expenditure is made without a requisition or letter of authorization approved by the Director.

All official payments are made upon vouchers, bearing affidavits, executed as the original bills.

Vouchers are supported by subvouchers (receipts) where incidental expenses are incurred; these subvouchers being attached to the vouchers which are submitted for final payment.

The official accounts are audited annually and the annual inventories, required for all properties, checked each year by Certified Public Accountants employed by the Board of Directors.

No travel is performed without written authority, issued in advance, speciffically stating the purpose of such travel.

RESULTS SECURED

Stomach Worms of Sheep and Goats

In continuing the work on stomach worms of sheep and goats, ef-

forts were directed toward determining the value of carbon tetrachloride and nicotine sulphate (Blackleaf 40) as an agent to eliminate the stomach worms from the animals. Only nine goats were available for the work. Four of these goats each received 40 cc. of carbon tetrachloride in 120 cc. of castor oil. In three goats, an efficiency of 100 per cent, and in the fourth animal an efficiency of 90 per cent was secured. Two of the animals used were only mildly affected, while the other two were heavily infected with the worms. The 90 per cent efficiency was secured in one of the heavily infected animals. The other five animals each received 120 cc. or a two-per cent solution of Blackleaf 40 in distilled water. In one goat, 100 per cent efficiency was obtained. The other three goats in this lot did not harbor any stomach worms.

Loin Disease of Cattle

All material collected for bacteriological study of the loin disease during the latter part of 1922, which had not been worked up completely when the last report was made, has now been fully worked up. No organism was found in this material which could be considered the possible cause of loin disease. During the spring of 1923 an outbreak of the disease occurred, and efforts were made to isolate the organisms from internal organs of cattle suffering from the disease, but these efforts were abandoned because of the continuation of negative results in all cases, and because of the outcome of an experiment which indicated that the organism should be sought in a different manner. This experiment led to the production of a typical case of loin disease in a steer by feeding ground bone meal made from bones of cattle which had died from loin disease. The bones were picked up on the prairies, where the animals had died from the disease in the field. The steers were fed upon the bone meal in a mixture with grain. During the greater part of the experiment, two pounds of ground bone meal was consumed by each steer each day, with a total consumption of 35 pounds per steer for the period. One of the steers went down with a typical case of loin disease three days after receiving the last ground bone meal, or 22 days after the beginning of the test. On the fourth day after going down this steer was posted. Lesions found were identical with those found in field cases of this disease. The production of this case led the veterinarian to seek toxin-forming organisms in the bones of the cattle destroyed in the last stages of the disease. No such organism has yet been found. Efforts were made to cultivate the casual organism from bones collected on the prairies, but loin disease was not produced from these cultures.

Sheep Scab Mite

A comprehensive study of the sheep scab mite was undertaken during the year. This study is being made at Substation No. 14, the Ranch Experiment Station, near Sonora, in cooperation with the Texas State Live Stock Sanitary Commission and the United States Department of

Agriculture, Bureau of Entomology, with the substation veterinarian as the leader.

Fixation of Phosphoric Acid by the Soil

A study was made of the relation of fixation to properties of typical Texas soils, especially as related to the loss of phosphoric acid from fertilizers, or the estimation of active plant food in the soil. A comparison of fixation at different temperatures showed that with some soils considerable increases took place when the temperature increased. The fixation of phosphoric acid by the soil increased with the time of contact. The addition of two grams of salt, added to precipitate the clay, had little effect upon the amount of phosphoric acid fixed. Treatment with acid, which would remove the carbonate of lime, had little effect upon fixation by some soils, while it decreased the fixation by other soils considerably. Igniting the soil increased the power of the soil to fix phosphoric acid, even when the lime had been removed by previous treatments with acid. A number of minerals examined for fixation did not have high enough fixing power to explain fixation by the soils. The soil minerals have a higher fixing power than the minerals found in deposits. A lump of phosphate in the soil is probably surrounded by a solution decreasing in strength as the distance increases and by zones of soil particles which increase in fixing power, according to the more or less complete satisfaction of their fixing power by the soluble phosphoric acid.

Soils having a fixing power of more than 50 per cent lost practically no phosphoric acid when treated with acid phosphate and subjected to percolation. Soils having a fixing power of less than 50 per cent lost considerable amounts of fertilizer phosphoric acid by percolation. A large part of the fixation took place in the soil column below the mixture of soil and fertilizer. The amount of phosphoric acid in the percolate decreased as the time of contact between the soil and fertilizer increased before water was applied. Heavy rains would be required to cause loss of phosphoric acid even from soils of low fixing power, under natural conditions. A rain of 3 or 4 inches within 10 days might cause a loss of 3 or 4 per cent of the water-soluble phosphoric acid applied to light sandy soils with sandy subsoils having a fixing power of less than 50 per cent. An examination of 761 surface soils and 651 subsoils showed that the percentages of iron and aluminum oxides increased as the percentages of phosphoric acid fixed increased. The correlation factor R between the phosphoric acid absorbed and the percentage of iron and aluminum oxide dissolved from the surface soils was $.774 \pm .010$.

The correlation factor R for the subsoils was $.701 \pm .013$. There was a close correlation between the phosphoric acid fixed by the soils and the quantities of iron and aluminum oxides dissolved by strong acid from the soils. The correlation factor R between the quantity of lime dissolved by strong acid, and the phosphoric acid fixed was $.098 \pm .024$ and for the subsoils it was $.060 \pm .026$. There was little correlation between the phosphoric acid absorbed by the soil and the amount of lime present.

Organic Constituents of the Soil

The determination of organic carbon in the soil throws little light upon the quality of the soil and is hardly necessary for ordinary soil analysis. The percentage of organic carbon can be judged from the percentage of nitrogen present. The average percentage of pentosans increases with the average nitrogen content of the soil. Surface soils contain slightly more pentosans in proportion to nitrogens than subsoils, but the difference is very small. Pentosans in cottonseed meal disappeared rapidly from the soil during the first week, and at the end of eight weeks, 7 per cent of the original pentosans were present from cottonseed meal, 31 per cent from Sudan grass, 61 per cent from rice bran, and 75 per cent from sheep excrement.

The amount of reducing substance, calculated as sugars, produced by heating the soil with 1¼ per cent sulphuric acid varied from .002 to .215 per cent with the average of .058 for 77 soils. The nitrogen insoluble in permanganate was studied, but no relation could be found between the soluble and insoluble nitrogen and the results of pot experiments with nitrogen on soils. Salt water, 10 per cent, dissolved .005 per cent of nitrogen on an average, from 43 soils averaging .146 total nitrogen. The results seem of little significance. On an average, 10 per cent of the nitrogen of the soil was dissolved by N-10 potassium hydroxide from 21 soils.

Soils of Bell, Jefferson, Smith, Taylor, and Webb Counties

Extensive studies were made of the chemical composition, fertility, and possible chemical needs of various types of soil from Bell, Jefferson, Smith, Taylor, and Webb Counties, and the results of these studies were published in Bulletin No. 301.

Needs of Soils for Sulphur

Soils of Brazos and Jefferson Counties were analyzed for their content in sulphur. Pot experiments to test the effect of applications of sulphur on corn, sorghum, alfalfa, and some cotton, were carried on for two years with soils of Brazos County and of some other counties. The analyses and the pot experiments both show that these soils are not deficient in sulphur. Sulphur exercised a harmful effect upon some of the soils of Brazos County tested, reducing the yield and causing the plants in some pots to die very young.

The acidity of some Brazos County soils was increased by the addition of sulphur. No relation was found between the percentage of nitrogen and that of sulphur in the sorghum grown in the pots. The plants showed a tendency to take up more sulphur with an increased supply of this substance. The soils of Brazos County which were tested were found to contain more sulphur than phosphoric acid.

Field experiments at the Temple Substation showed that elemental sulphur as a fertilizer for cotton slightly decreased the yield of cotton as compared with the yield of plats which received no fertilizer treatment.

These results confirm those of the crop season of 1921. In this investigation, so far at least, the use of sulphur has had no appreciable influence on the development and control of root rot in cotton.

Fertilizer and Insecticide Control Service

The Chief of the Division of Chemistry is also State Chemist of Texas and as such is in charge of the enforcement of the fertilizer and insecticide law. The details of this work are reported in the annual bulletin on commercial fertilizers and insecticides, published by the Station System.

Horticultural Investigations

The Division of Horticulture has continued the breeding work with dewberries and raspberries, with a view to developing improved berries adapted to Texas farm conditions. Studies are also being made of the longevity of the old-fashioned Indian Cling peach; the adaptability of the *Vitis vinifera* grapes; citrus fruits at Substation No. 1, Beeville; the adaptability of fruits of various kinds to the Toyah Valley; plant propagation studies; and problems of fig, pecan, and pomelo production.

It is planned to select a more suitable site for the horticultural grounds and test plats during the coming year, with the view to removing this type of field work to a more satisfactory soil.

Comparing Grain Sorghums and Corn for Fattening Lambs

Bulletin No. 306 summarizes the results of previous work on this question and gives the results of the third-year test which was undertaken on a larger scale than the previous work. Ten lots of 20 lambs each were used. Each lot received the same amount of cottonseed meal and alfalfa and the same weight of one of the following grains: corn chops, milo chops, whole milo, milo heads, feterita chops, feterita heads, kafir chops, kafir heads, darso chops, and sorgo chops.

No significant difference was found in the feeding value of corn chops, milo chops, and kafir chops, all of which were more valuable than the other seven feeds. Feterita chops, darso chops, sorgo chops and whole milo all proved to have about the same value pound for pound and were only a little less valuable than the three first mentioned. Kafir heads, milo heads, and feterita heads were the least valuable of the 10 feeds tested, but even they proved to have a high feeding value and when correction is made for the amount of stems which these three feeds contain, their value is fully as great as that of the ground threshed grain. All lots brought the same price on the Fort Worth market and seemed to be equally well finished. The feeding values of these 10 feeds are calculated and given in therms.

Swine Feeding Experiments

Bulletin No. 305 includes reports of five different experiments, two of which deal mainly with growing pigs and three with fattening mature pigs.

The first experiment was planned to test out the value of tankage and pasture in raising pigs from birth to maturity. At the age of eight months, the pigs which had been fed milo in a dry lot weighed 21 pounds each and had no selling value. Those which had been fed milo and tankage in a dry lot weighed 157 pounds and showed a profit of $1.54 per pig. Those which had access to pasture weighed 249 pounds and showed a profit of $4.59 per pig. Those which had been fed only milo in the dry lot until weaning time and had then been given pasture and tankage, weighed 202 pounds and showed a profit of $3.73 per pig.

The second experiment was planned to study the value of dried buttermilk as compared with tankage for pigs from weaning time, and also to study the results of adding shorts to a ration of milo chops supplemented with tankage or dried buttermilk. Dried buttermilk proved to have a value superior to that of tankage pound for pound, but, on account of its higher price, was less profitable. Also some trouble was experienced from the pigs' going "off feed" when large amounts of dried buttermilk were fed. There was no advantage gained by adding shorts to the ration.

The third experiment was planned to compare whole cottonseed, cottonseed meal, and tankage, as supplements to milo chops when fed to fattening hogs. Four lots of 10 pigs each were used. The lot which received the whole cottonseed refused to eat it and picked out the milo and tankage and left the cottonseed in the trough. This lot was therefore discontinued and no definite results with regard to the cottonseed were secured, except the fact that it was not palatable. Tankage alone proved superior to cottonseed meal or to a combination of cottonseed meal and tankage. One pig died of cottonseed meal poisoning in the lot which received the largest amount of cottonseed meal.

The fourth experiment was planned to show how grazing on a peanut pasture affected the quality of pork produced after fattening. The effects of using a free choice self-feeder as compared with hand-feeding were studied. Soft pork was produced by the lot which was on peanut pasture the entire feeding period and some soft and some hard carcasses by the lot which was on peanut pasture only during the first half of the feeding period. The successful use of the free choice self-feeder requires that only those feeds be used which are palatable to the pigs and with which they are familiar.

The fifth experiment was undertaken to find out the firmness of pork produced by six different rations fed to fattening pigs and also to find out how these rations compared with each other in the amount and economy of the gain which they produced. Milo chops seemed a little superior to corn chops. Cottonseed meal gave good reults as a protein supplement. Wheat shorts fed in large amounts were not a very satisfactory feed. Rice bran was only fairly satisfactory and produced softer pork than the other rations, although not soft enough to be penalized at the market.

Rice Bran and Rice Polish for Growing and Fattening Pigs

Bulletin No. 313 summarizes briefly the results of two experiments conducted during 1922-23. Rice polish seemed to have about the same feed value as corn chops, but, when fed in large quantities, caused digestive disturbances. Pigs would not eat as large an amount of the ration containing rice polish as they would of the ration which contained only corn chops and tankage. One of the 20 pigs which received the rice polish killed out slightly soft. Eleven of the 20 pigs in the same experiment which received rice bran killed out slightly soft. The use of rice bran in the ration lowered the rate of gain and increased the amount of feed required for 100 pounds of gain as compared with rations consisting of corn and tankage alone. Rice bran seemed to be less valuable during the growing period than during the fattening period for swine. Rice bran produced soft pork when fed in large quantities for a long time. It seems fairly certain from these experiments that rice bran must be purchased at a considerably lower price than corn before it can be fed profitably in large amounts to pigs and that it cannot be fed for a very long time without danger of producing soft pork.

Cottonseed Meal and Hulls With and Without Corn, and the Influence of Age in Fattening Steers

The first part of Bulletin No. 309 is a report on an experiment which was to determine whether the adding of corn to a ration of cottonseed meal and hulls for fattening mature steers would be more profitable than the feeding of meal and hulls alone in years when corn is extremely high in price. One lot of 11 and one lot of 10 two-year-old Hereford steers were fed for 120 days, and those receiving corn gained about one-third more than those which received only meal and hulls. This difference was greatest toward the end of the feeding period because those steers which received only meal and hulls fell off much more rapidly in their rate of gain during the last 30 days, almost ceasing to gain at all during the last 15 days. The steers receiving only meal and hulls required a greater amount of feed to produce 100 pounds of gain, but utilized more roughage and less concentrates. The steers receiving corn finished so much heavier and fatter that they sold for 84.3 cents more per 100 pounds than those not receiving corn, thereby more than making up the extra cost of their feed and returning a slightly larger profit. It was impossible to finish the steers on meal and hulls to as high a degree as those receiving corn because the former were ceasing to gain in weight. The inability to finish the cattle was the most serious single defect of the meal and hulls ration. This experiment seems to show that corn or one of the grain sorghums should not be left out of the fattening ration unless cottonseed meal is very much cheaper pound for pound.

The second part of the bulletin gives the results of an experiment which was to determine the effects of age upon fattening steers. One lot of 11 long two-year-old Herefords and one lot of 15 long yearling Herefords

were fed for 120 days on a ration which was practically the same per 1000 pounds of live-weight. The older steers gained more per steer, but less per 1000 pounds of live-weight and the average cost of gain was higher with the older steers. When they were marketed, the older steers were fatter than the younger ones and outsold them 59 cents per 100 pounds and outdressed them 1.04 per cent.

Studies of the Weights of Fleeces Produced by Range Sheep

Bulletin No. 311 presents the results of a study of the fleece weight records of 12 registered Corriedale ewes, 23 registered Rambouillet ewes, and 95 grade Rambouillet ewes and their descendants, a total of 504 different sheep, each of which was sheared at least twice and some of them as many as seven times in the period from the summer of 1917 to the summer of 1923. These sheep were kept under typical range conditions in Southwest Texas and the differences in their fleece weights were found to be rather constant from one shearing to another. The average coefficient of correlation between the fleece weights at one shearing and the fleece weights for the same sheep at another shearing was +.607. The correlation was higher in the case of registered ewes. The correlation was high enough in all cases to prove that culling sheep on the basis of fleece weight would be a very profitable practice for the ordinary ranch. The most practical time for culling is probably at the yearling shearing age or, in the case of lambs which have been reared in a year of drouth, at the two-year-old shearing. Six-month shearings are almost as reliable as twelve-month shearings for culling purposes. The wool production of a sheep at one shearing is just about as accurate an indication of its future production as a one year's milk-and-fat record is of the future production of a dairy cow and is as accurate an indication as the first year's egg production is of a hen's future egg production.

The maximum fleece production is attained at two years of age in the case of ewes and probably three or four years in the case of wethers. Ewes eight years old in this flock have not shown any decided decrease in wool production due to age alone. Abnormal seasons will influence wool production enough to obscure the effects of age.

The Practicability of the Milking Machine

Circular No. 30 contains a report of an eight-month test of milking machines at the Station dairy plant, together with a statement of the cost of operating these machines for a period of three years, and also contains a comparison of these results with the results from other experiment stations.

Machine-milking does not produce as clean milk as hand-milking where ordinary care and cleanliness are used, but by the use of extra precaution, machines can be made to produce milk of as high a degree of cleanliness as any market demands. Even certified milk can be produced by machines, but special care is required. Three cows were milked by the machine in

about the same time required to milk two by hand. Because the milking machine saves a certain amount of time per cow and not a certain amount per machine, it is much more profitable in a large than in a small dairy. Usually it is not regarded as practical where less than 15 cows are milked and is regarded as almost always practical where more than 30 cows are milked. The character and reliability of the labor supply is one of the most important things in determining whether a machine is practical or not.

Directions are given for preparing a sterilizing solution which will keep the milking machine parts as free from bacteria as possible.

Sweet Potato Weevil

A comprehensive study of the life history and the control measures of the sweet potato weevil has been completed. It was found that this insect, *Cylas formicarius*, is an introduced pest. It is the most destructive insect enemy of sweet potatoes in Texas, and is widely distributed within the State. The climatic conditions of the Gulf region are especially favorable for its development. All varieties of sweet potatoes grown in Texas are attacked by the weevil, and the annual loss resulting from the ravages of this pest is very great. The average life cycle comprises 35 to 40 days under favorable conditions. More than 500 eggs may be deposited by the female weevil, although the average number is considerably less. The length of adult life is often protracted, and may extend upwards of 300 days. In stored tubers, feeding and breeding may be continued throughout the year. Under laboratory conditions eight generations of weevils were obtained in a year. The sweet potato weevil does not enter into a definite period of hibernation at College Station. There were no parasites or predacious enemies observed that are of economic importance. Artificial measures of control must be used in combating this pest. Crop rotation and clean culture are important features in controlling the insect. Remedial measures consist of: (1) spraying with arsenicals; (2) the use of weevil-free propagation plants; (3) prompt and thorough harvesting; (4) fumigation with carbon bisulphide; and (5) proper storage.

The following is a summary of the measures available for the control of the sweet potato weevil:

1. Legislative enactment of quarantine regulations which prevent the movement of infected sweet potatoes or propagation plants from infested localities to regions where the weevil does not exist, will prove to be the most effective measure in preventing further spread of the pest.
2. Destroy all volunteer sweet potato plants and morning-glory vines on the premises throughout the year.
3. Practice crop rotation and never grow sweet potatoes on the same land during successive years.
4. Plant the new crop as far as possible from the seed-bed and storage house.
5. Frequent shallow cultivations prevent the soil from cracking and reduce the possibility of any weevils' reaching the roots thus exposed.

6. Whenever possible, use only seed sweet potatoes or propagation plants grown in a region where the weevil does not occur.

7. Destroy the first appearing weevils by spraying with arsenical poisons.

8. Harvest as soon as the crop is mature, and exercise every precaution to remove all the tubers from the field. Destroy all useless materials and the vines by burning in the field immediately after harvesting. Cook the infested tubers before feeding them to stock.

9. In handling infested tubers use extreme caution to prevent any weevils from escaping.

10. Fumigate infested tubers with carbon bisulphide when they can be utilized soon after treatment.

11. Do not store tubers in banks or pits. Whenever possible utilize the advantages offered by community storage houses, or construct a suitable house in which the tubers are kept dry and are available for inspection at all times.

12. Cooperation by all growers in the observance of these measures is necessary to obtain the maximum reduction of the losses incurred from the ravages of the sweet potato weevil.

State Apicultural Research Laboratory

The investigations relating to the beekeeping industry, formerly carried within the Division of Entomology, have been placed on a separate basis and are now carried at the State Apicultural Research Laboratory, located near San Antonio, in Bexar County. In connection with the main laboratory, there is a queen-rearing yard, and separate research bee outyards are maintained at Dilley, Roxton, and Seguin. At the main laboratory, a cottage has been erected, and a machine-shed and garage have been added. The laboratory is located on a tract of 10 acres, owned by the State, all of which has been cleared. A number of plats have been put into cultivation, for honey-producing plants, especially those adapted to semi-arid districts. The colonies at San Antonio yielded 75 pounds of honey each; those at Dilley, 90 pounds; and at Roxton, 85 pounds.

The laboratory is in charge of a well-trained and competent apiculturist, who, with the aid of a scientific queen breeder, is conducting a number of scientific researches looking to the betterment of beekeeping conditions in Texas. This work has been undertaken at the urgent request of the beekeepers of the State, who are in close touch with the investigations being carried. Included in the projects under way are investigations of the winter activities of bees; honey plants; composition and utilization of propolis; a binomical and systematic study of the super-family *Apina;* paper-making wasps; and other questions affecting the beekeeping industry of the State.

Foulbrood Eradication

The statutes of Texas place the administration of the State law regulating foulbrood in honey bees in the hands of the Director of the Station

System. The details of the work are carried out by the Chief of the Division of Entomology, who is ex-officio State Entomologist. The aims of the foulbrood eradication work have been to clean up all diseased areas, to find as many as possible of the hitherto unknown or newly infected areas, to inspect the apiaries of all queen breeders and shippers of bees, to trace the origins and outbreaks of disease in order to prevent the further introduction and spread of foulbrood.

Inspection extended to 63 counties in the State, and American foulbrood was present in 26 of the counties inspected. Several new disease areas have been located, and a number of infected areas have been cleaned up. No European foulbrood was disclosed by the year's inspection. During the year 38,037 colonies of bees were inspected and only 411 were affected with American foulbrood. Of these, 14 colonies were treated and 397 were destroyed by burning. Forty-one queen breeding establishments were inspected and certificates were issued to all of them.

The Interpretation of Correlation Data

Bulletin No. 310, issued during the year, summarizes the interpretation of correlation data as follows:

1. Correlation implies a casual relationship or connection. Correlation data dealing with biological material should have the most careful analysis, giving due consideration to the casual agency or agencies if the data are to be of the greatest value.

2. To summarize the different kinds of correlation: the most workable classification for the student of biological data to use is one grouping the kinds of correlation into two classes—genetic and non-genetic.

3. The general features of the correlation table are shown and illustrations given of the meaning of different placements of frequency distributions in the table, and showing also the possibilities in the analysis of material where the non-genetic correlation is known.

4. In interpreting population data one should bear in mind that the correlation obtained may apply only to the particular population studied. It is evident that population material may be of doubtful value in drawing conclusions as to correlation between characters. Accordingly, one should be very cautious not to overestimate its value.

5. In the interpretation of pure-line data one can determine with certainty the measure of the non-genetic correlation. From pure-line correlation data one may also determine the variation in non-genetic correlations from season to season. From line data one may show by correlation whether genetic variation exists and hence determine the stability of the line with respect to the characters studied.

6. Since the pure line gives a reliable measure of non-genetic influences, the comparative use of pure-line and population data will permit in many cases the determination with certainty that genetic correlation exists, and with this knowledge one may with certainty isolate families showing such correlation and by other means determine the nature of the genetic correlation.

Soil Fertility

In the rotation and fertilizer work, which includes cottonseed meal, acid phosphate, ground raw rock phosphate, and manure, at the Main Station the use of cottonseed meal and acid phosphate together made the largest yield of cotton and corn when rotation of crops was practiced, but the increase due to the fertilizer could not be stated as profitable. Rotation has materially increased the yield of crops as compared with the yield made by non-rotated crops. Rotation, to a large extent, decreased the loss from cotton root rot at the Temple substation. In the soil fertility and moisture conservation studies being made at Substation No. 7, Spur, the largest yield of feterita, 11.6 bushels to the acre, was obtained in a three-year rotation of cotton, feterita, and green-manure crops. This rotation has also produced the highest average yield, 23.9 bushels to the acre, for the eight years from 1915 to 1922 inclusive. A four-year rotation of cotton, feterita, green-manure crops, and fallow made the highest yield of cotton, 173 pounds lint cotton to the acre in 1922, and also produced the highest average yield, 171 pounds lint cotton to the acre, for the eight-year period from 1915-1922. The general conclusions from this work at Spur and Lubbock are that with intertilled crops green-manure and fallow are not profitable, and that the alternate cropping of cotton and grain sorghum is perhaps the most practical cropping system to follow of the 25 cropping systems studied.

Time and Method of Intertillage

In the time and method of intertillage studies, six kinds of tillage or treatments are used; cultivating one, two, three, and four times during the season; removing weeds with the hoe and giving no cultivation, and permitting weeds to grow with no cultivation. Removing weeds with the hoe gave the best results with cotton in 1922 at Spur, producing 106 pounds of lint cotton to the acre. There was, however, very ilttle difference in yield where the weeds were removed with the hoe as compared with cultivating one, two, three, and four times in the season. The crop was a complete failure where the weeds were allowed to grow. Cultivating twice during the season produced the highest yield of cotton, 220 pounds of lint to the acre, for the four years from 1917 through the years of 1919, 1921, and 1922. Where the crop was not cultivated and the weeds were allowed to grow, an annual yield of 57 pounds of lint was secured.

The largest yield of feterita was obtained from the plat which received only one cultivation during the growing season, although there was very little difference in yield from this treatment and plats on which the crop was cultivated, two, three, or four times, and plats on which the weeds were removed without cultivation. The plat which received no cultivation and on which the weeds were permitted to grow, gave almost a complete crop failure. For a period of six years the largest average yield, 23.88 bushels of grain to the acre, resulted from cultivating three times during the season. The results this year confirm previous work, showing

that weed growth is a greater factor in crop production than the method of cultivation. It was also shown that the cheapest and easiest way to kill weeds is by the ordinary method of cultivation.

Cotton Thinning

Results secured at the substations in the study of rate and distribution of seed and time of thinning cotton indicated that medium thick planting, 6 to 18 inches in the row, gives the highest yields. These results indicate also that deferred thinning of cotton decreases the yield as compared with thinning at the usual time. A bulletin is in course of preparation in which these results will be given.

Rice Iprovement

The work in rice improvement and method of production tests showed satisfactory progress in connection with the variety tests and nursery variety tests. Several good lots of material were secured from importations from the Philippine Islands. Progress has been made in combating red rice as a soil-carried weed on the Beaumont Substation. The rice fertilizer test was carried through the eighth year. The results continue to indicate the value of sulphate of ammonia as a fertilizer for rice.

Seed Laboratory

The seed laboratory, formerly operated in cooperation with the Seed Laboratory of the United States Department of Agriculture, has been conducted by the Station alone during the past year. Valuable assistance has been rendered to planters and farmers generally throughout the State through germination tests of planting seeds.

Texas Root Rot Disease

Texas root rot is a disease which was first found and described in Texas, hence its name. For forty years this trouble has puzzled both scientists and cotton growers. This Station has devoted seven years of intensive work to a study of this trouble, primarily as it affects cotton. The symptoms of this disease have been worked out so that it can not be mistaken for other troubles of the cotton, and its distribution both in Texas and the United States has been fairly well established. It is now known to occur in Texas, Southern Oklahoma, New Mexico, Arizona, Southern California, and it is also known to occur in Mexico.

A careful study was made of the various hosts which are susceptible to Texas root rot. Sixty-seven families of plants were studied and classified as to their resistance or susceptibility. These sixty-seven families include field crops, truck chops, fruits and berries, ornamentals, shrubbery, forest trees, and weeds.

The cause of Texas root rot disease has been definitely established, and a method has been devised to isolate the fungus and to keep it indefinitely free from contamination. For the first time the Texas Station has

been successful in definitely proving that the root rot fungus, *Phymatotrichum omnivorum*, is the cause of the Texas root rot disease. This was proved through artificial inoculations. For the first time this Station has proved through cultural experiments that the Texas root rot fungus is not a sterile organism, but that it is capable of forming spores. So far, however, such spores have failed to germinate.

No one variety of cotton has proved more susceptible or resistant than the other, although there are apparent indications of the existence of resistant strains in each variety.

When a susceptible perennial crop precedes cotton, more Texas root rot will be found in the cotton the second year. For this reason, cotton will have root rot when following sweet potatoes, for instance, because many of the underground sweet potato roots remain alive in the ground and carry over the root rot fungus.

The Texas root rot disease seems to be more prevalent and much more severe during wet seasons. These conditions favor a more copious development of root system, which results in better underground root contact.

Contrary to general belief, deep plowing will not control root rot as long as weed carriers are not entirely killed out by the plowing. The same is also true of crop rotation. No system of rotation has been found effective in controlling Texas root rot disease as long as clean culture is not practiced and weed carriers are permitted to live over in the soil during the winter months. Sulphur, lime, and fertilizer have been ineffective in controlling Texas root rot. A solution of one pint of formaldehyde to 20 gallons of water, applied to the soil at the rate of one gallon of the mixture to one square foot, will greatly reduce the amount of root rot, although it does not entirely eradicate it. Formaldehyde can, of course, only be used on a small scale in garden lots.

It has been shown that the Texas root rot fungus cannot live in the soil as such, but there must be in the soil living roots of a susceptible host on which to winter over. In fact, the disease works underground in the winter just as much as it does in the summer. As long as such winter carriers are permitted to remain in the ground, Texas root rot will persist in the land. It has been found that the Texas root rot will have a tendency to check itself during a period of years. This is explained by the fact that the disease, when very virulent, kills out weed carriers so that the following year it will have killed itself out for lack of a host on which it can winter over. It comes back, however, with the return of the weed carriers which are always found in the soil in the way of dormant seed. Perhaps one of the worst winter carriers of the Texas root rot disease is the perennial tie-vine, *Ipemoeae trichocarpa*. Likewise, cotton, okra, pepper, roots of susceptible shrubs, trees, or fruits, will help to carry it over winter.

In the light of these studies, Texas root rot cannot be controlled unless systematic and stringent methods are used in killing out the fungus from living over on live roots of susceptible hosts. This means that

clean culture must be practiced. Rotation with non-susceptible crops will be effective only if clean culture is practiced.

Farm and Ranch Economics

An agricultural economic survey of Rockwall County, a typical black land cotton farming area, was completed during the year. In this survey, more than 500 separate schedules were taken from the farms in the county. These schedules have been checked and the data tabulated and placed in manuscript form for publication during the coming year. This study includes the problems of land tenure, land utilization, rural credit, and agricultural insurance in Texas, and the results should be of value to the cotton farmers of the area in meeting and solving these problems in their various phases.

The study of the carrying capacity of the ranges on the Ranch Experiment Station, Substation No. 14, in Sutton-Edwards Counties, has been revised and methods of procedure perfected, so that the work is continuing with promise of yielding highly valuable results. This study is intended to determine the actual carrying capacity units supplied by the ranges as a whole and also by the various pastures, the units used by the various types and classes of livestock grazed; to note the behavior of the various forage plants under varing systems of grazing; to note the behavior of forage plants on the enclosed quadrats; to note the condition at different seasons of the year of the various classes and types of livestock on the ranges; to note the grazing, watering, salt-licking, and bedding habits of the different types and classes of livestock; and for the chemical analysis of various grazing and forage plants growing on the ranges.

The dairy marketing study, made in cooperation with the American Farm Bureau Federation, has been completed, and the material is now being tabulated for publication by the Station.

Soil Surveys

The Division of Soil Survey, conducted in cooperation with the Bureau of Soils, United States Department of Agriculture, has continued its task of surveying the soils of Texas, by counties. During the past year a detailed survey was made of Wichita County, and in addition a complete detailed survey was made, in cooperation with local citizens, of the area served by the Wichita Valley Irrigation Project. Early in 1923, a detailed survey was started of Hidalgo County and it is expected that this project will be completed before the half of the coming year is up. The detailed survey of Nacogdoches County, started also in 1923, is progressing, and it is expected that the work will be completed during the coming year. The survey of this county will be especially valuable, in that Substation No. 11, located near Nacogdoches, has for years been securing valuable fertilizer and crop rotation results on the Orangeburg soils there.

During the year it is calculated that approximately 2000 square miles have been covered by the soil surveys of the Station. This has been made

possible, with a very small personnel, largely through the speeding up of the work and through the employment of efficient methods in soil surveying and the perfection of distance-measuring devices by the soil survey specialists on the staff.

Feed Control Service

Through the Division of Feed Control Service, the feed law has been quietly and efficiently administered throughout the year, to the end that consumers have been protected against adulterated and inferior concentrated commercial feeding stuffs. The small number of irregularities encountered would indicate that the feed market is now in satisfactory condition. This has no doubt come about by the feeling on the part of consumers that any feeding stuff bearing the Texas tag is as good or better than it is represented to be. The administration of the pure feed law in this State has without doubt increased the sale and consumption of high-grade feeding stuffs, and reduced the sale and consequent consumption of low-grade feeds.

During the year, feed inspectors secured 1490 official samples for analysis, and in addition 607 registration samples and 58 special samples were analyzed, making a total of 2155 samples of feed analyzed during the year.

Cooperative relations were continued with the Bureau of Chemistry of the United States Department of Agriculture. Under these relations, 10 samples were drawn from feeding stuffs in interstate commerce, and it was found that each sample so taken represented feeding stuff being shipped in violation of the Food and Drugs Act of 1906.

SUBSTATIONS

A considerable number of the activities of the Station System are devoted to the lines of investigation and research conducted on one, several, or all of the 17 locations in various parts of the State where continuous, systematic work is under way. These field locations are permanent substations in 13 cases, and had their origin in the fact that field experiments conducted at the Main Station would not yield definite information applicable to every part of the State. Much of the work conducted at these outlying points is original and fundamental research, which, because of climatic or soil factors, cannot be prosecuted at the Main Station. Other work of the substations, however, is devoted to a testing out of the current results produced by the scientific staff of the Station System, in the attempt to make practical use, in each of the several locations, of work which has had its origin in the technical laboratories at the Main Station.

Attention is specifically directed to the fact that these outlying field locations are outdoor laboratories wherein accurate, definite, detailed records of experiments are secured.

Each of the substations carries one or more specific responsibilities in addition to its function as a definite unit for the regional testing out

of the findings of the Main Station. The particular lines of work most stressed on each one of the substations are as follows:

Substation No. 1, Beeville: Investigations with hardy citrus fruits and dry-farming agronomic investigations.

Substation No. 2, Troup: East Texas fruit and vegetable crops, together with horticultural and field crop soil fertility investigations.

Substation No. 3, Angleton: Crop production on the Gulf Coast Plain, including studies of forage crops, grasses, legumes and fruits, as well as drainage investigations.

Substation No. 4, Beaumont: Rice and rice farming, together with the supplemental crops, irrigation, drainage, and fruit industries, which must go with rice farming.

Substation No. 5, Temple: Cotton breeding and improvement, cotton diseases, particularly cotton root rot, and all crops needed in a rotation with cotton, as well as fertilizers, drainage and fruit problems for Central Texas.

Substation No. 6, Denton: All crops adapted to the heavy soils of the black prairies, with particular emphasis on small grain, rotation and fertilizers.

Substation No. 7, Spur: The grain and forage sorghums of the broken region east of the High Plains, but including also cotton and other crops, and experiments on the utilization of the locally produced feed crops, including feeding experiments with cattle and sheep.

Substation No. 8, Lubbock: Suitable crops and methods of crop production on the High Plains, including fundamental research in the improvement of sorghums and cotton, together with studies in soil fertility, dry-farming, and supplemental irrigation.

Substation No. 9, Balmorhea: Irrigation farming in Southwest Texas.

Substation No. 10, College Station: Studies in the feeding, breeding and management of livestock, with particular reference to those types of work which will have Statewide value.

Substation No. 11, Nacogdoches: The development of a profitable system of crop production and soil management in East Texas, including fertilizer investigations and specific inheritance studies in peanuts.

Substation No. 12, Chillicothe: This is a forage crop testing farm, specifically devoting a large amount of its attention to the trying out and development of new forage crops, but including supplemental work with farm crops and farm practices.

Substation No. 14, Sonora: A study of ranch animal husbandry and ranch management, with sheep, goats and cattle, as well as studies of veterinary problems related to the livestock industry.

The other outlying laboratories, four in number, are all specifically concerned with fundamental studies relating to the bee and honey industry of Texas, in locations differing essentially in their suitability for certain lines of this work.

STATION LANDS

The following table shows the lands owned and operated by the Station System for agricultural research purposes:

Designation	Acres of land devoted to various uses			
	Area	Cultivation	Pasture	Farmstead, roadways, and miscellaneous
Total	6,445.07	1,204.6	5,080.27	160.2
Main Station Farm	*127	98	11	18
Division of Veterinary Science	*141	5	130	6
State Apicultural Research Laboratory, San Antonio	10	6	1	3
Substation No. 1, Beeville	151.5	63.2	84.3	4
2, Troup	150	50	90	10
3, Angleton	157	51	100	6
4, Beaumont	100	60	30	10
5, Temple	96	37	55	4
6, Denton	209.92	163	34.92	12
7, Spur	406.35	104	292.35	10
8, Lubbock	160	109	41	10
9, Balmorhea	200	68	120	12
10, College Station	**901.8	212	674.8	15
11, Nacogdoches	82.5	33.4	38.9	10.2
12, Chillicothe	100	80	10	10
14, Sonora	3,452	65	3,367	20

*Included in main tract of College land.

**Includes 636 acres of the College's main tract and 265.8 acres purchased later for research purposes.

COOPERATION

In accordance with the long-established policy of the Texas Station to cooperate wherever cooperation may be mutually desirable, formal agreements providing for cooperative research have been entered into or continued during the year as follows:

1. Office of Forage Crops, Bureau of Plant Industry, United States Department of Agriculture, in the operation of Substation No. 12, Chillicothe, Texas, and in general forage crops investigations throughout the State.

2. Office of Foreign Seed and Plant Introduction, Bureau of Plant Industry, United States Department of Agriculture, for the introduction, propagation, and distribution of newly introduced plants giving promise of becoming valuable in Texas.

3. Office of Cotton and Truck-Disease and Sugar-Plant Investigations, Bureau of Plant Industry, United States Department of Agriculture, for an annual plant disease survey in Texas and for a general study of plant diseases.

4. Office of Horticultural and Pomological Investigations, Bureau of Plant Industry, United States Department of Agriculture, for the testing of Northern-grown seed Irish potatoes in comparison with seed of Irish potatoes of local and State origin.

5. Bureau of Soils, United States Department of Agriculture, for the conduct of soil survey work in Texas.

6. With the Bureau of Entomology, United States Department of Agriculture, for cooperative investigations of insects and parasites affecting livestock.

7. Bureau of Animal Industry, United States Department of Agriculture, for investigations as to the adaptability of Corriedale sheep to Texas conditions and for the study of soft pork problems.

8. Bureau of Agricultural Economics, United States Department of Agriculture, for studies of farmer's and ranchmen's business organizations and in making an agricultural economic survey of a typical crop-farming area in the blacklands of Texas.

9. The Freeport Sulphur Company for the study of composting sulphur with different soils.

10. The Barrett Company of Texas, for cooperative investigations in rice improvement and methods of production.

11. The School of Agriculture, Agricultural and Mechanical College of Texas, wherein Station men may give lectures to students and teachers may do cooperative investigation work for the Station.

12. With the School of Veterinary Medicine, Agricultural and Mechancial College of Texas, whereby the Dean of the School of Veterinary Medicine acts as Chief of the Division of Veterinary Science for the Station.

13. The School of Engineering, Agricultural and Mechanical College of Texas, wherein certain professors may cooperate with the Station workers in agricultural studies involving engineering problems.

14. The Extension Service, Agricultural and Mechanical College of Texas, whereby Extension workers from time to time suggest the more important problems confronting Texas farmers and stockmen and certain Extension specialists cooperate with the Station in making certain investigations mutually agreed upon.

15. The Williamson County Belton Cotton Seed Growers Association of Granger, Texas, for the increase and distribution of seed of pure Belton cotton.

16. The American Farm Bureau Federation, for the conduct of cooperative investigations in dairy marketing.

17. The Texas State Live Stock Sanitary Commission, in studies of the sheep scab mite at the Ranch Experiment Station.

18. The Western Weighing and Inspection Bureau of Dallas, wherein the railroads of the State and Southwest furnish a fund for the conduct of research and investigations of the various transit and storage diseases affecting fruits, vegetables, and other field crops.

PUBLICAIONS

The following is a detailed statement of the 16 bulletins and one circular of the Station System which were printed and distributed during the fiscal year:

Number and Title	Number copies printed	Pages	Total number pages in edition
Total	187,000	871	9,393,000
Bulletin No.			
295 (Reprint) Correlation Between External Body Characters and Annual Egg Production in White Leghorn Fowls	5,000	15	75,000
300 Organic Constituents of the Soil	4,500	14	63,000
301 Soils of Bell, Jefferson, Smith, Taylor, and Webb Counties	7,000	34	238,000
302 The Needs of the Soils of Brazos and Jefferson Counties for Sulphur	4,000	23	92,000
303 Commercial Feeding Stuffs: September 1, 1921, to August 31, 1922	5,000	192	960,000
304 The Fixation of Phosphoric Acid by the Soil	4,500	22	99,000
305 Swine Feeding Experiments	14,000	41	574,000
306 Grain Sorghum Versus Corn for Fattening Lambs	18,000	32	576,000
307 Texas Root Rot of Cotton and Methods of Its Control	15,000	98	1,470,000
308 The Sweet Potato Weevil	15,000	90	1,350,000
309 I. Fattening Steers on Cottonseed Meal and Hulls with and without Corn.			
II. The Influence of Age on Fattening Steers	15,000	31	465,000
310 The Interpretation of Correlation Data	7,000	24	168,000
311 The Influence of Individuality, Age, and Season upon the Weights of Fleeces Produced by Range Sheep	11,000	45	495,000
312 Commercial Fertilizers in 1922-23	26,000	35	910,000
313 Rice Bran and Rice Polish for Growing and Fattening Pigs	16,000	18	288,000
314 Commercial Feeding Stuffs: September 1, 1922, to August 31, 1923	10,000	134	1,340,000
Circular No.			
30 The Practicability of the Milking Machine	10,000	23	230,000

Scientific Articles Written

In addition to the regular research bulletins and circulars, members of the staff have written 40 scientific and technical articles upon varying topics, for publication in journals, magazines, and periodicals of interest to scientific workers. These articles are carefully prepared and passed upon by the Director and when released are numbered and included in the regular "Contribution" series of the Station System.

FINANCIAL STATEMENT

A detailed statement of all funds devoted to the Texas Agricultural Experiment Station System is given in the pages immediately following. The fiscal year for the State appropriations is for the period from September 1, 1922, to August 31, 1923, while the fiscal year for the Federal Hatch and Adams funds is for the period from July 1, 1922, to June 30, 1923, and the financial schedules which follow are based upon these designations.

College Station, Texas,

August 31, 1923.

Director B. Youngblood,

Texas Agricultural Experiment Station System.

Dear Sir:

I do hereby certify that the following report upon the receipts and disbursements of the several funds devoted to the development, maintenance and support of the Texas Agricultural Experiment Station System for the fiscal year ending August 31, 1923, is just and correct, and that the funds have been expended in accordance with the Federal and State laws, to the best of my knowledge and belief.

(Signed) Chas. A. Felker,
Chief Clerk (Bonded)

Subscribed to and sworn before me, A. S. Ware, Notary Public in and for Brazos County, Texas, on the 31st day of August, A. D., 1923.

(Signed) A. S. Ware,
(Seal) Notary Public in and for
Brazos County, Texas.

Funds Available

HATCH FUND, from United States Treasurer for the year ending June 30, 1923	$ 15,000.00
ADAMS FUND, from United States Treasurer for the year ending June 30, 1923	15,000.00
SUBSTATIONS, from State Treasurer for the year ending August 31, 1923	82,485.00
DIVISIONS, from State Treasurer for the year ending August 31, 1923	115,500.00
SUBSTATION TREASURY, from Substation Treasury for the year ending August 31, 1923	57,320.89
MAIN STATION TREASURY, from Main Station Treasury for the year ending August 31, 1923	15,402.10
Total	$300,707.99

FEDERAL FUNDS

	DEBIT	CREDIT
HATCH FUND:		
Received from United States Treasurer	$ 15,000.00	$
Salaries		14,141.05
Stationery and office supplies		28.35
Telegraph and telephone		11.41
Farm machinery and appliances		161.09
Furniture and fixtures		242.00
Repairs and buildings		416.10
TOTAL	$ 15,000.00	$ 15,000.00
ADAMS FUND:		
Received from United States Treasurer	$ 15,000.00	$
Salaries		14,182.05
Labor		420.00
Heat, light, water and power		16.50
Chemical and laboratory supplies		125.16
Seeds and plants		170.59
Scientific apparatus		40.00
Travel		45.70
TOTAL	$ 15,000.00	$ 15,000.00

STATE FUNDS

	DEBIT	CREDIT
SUBSTATIONS:		
Received from State Treasurer	$ 82,485.00	$
No. 1, Beeville		4,403.29
No. 2, Troup		4,340.00
No. 3, Angleton		4,875.00
No. 4, Beaumont		4,635.11
No. 5, Temple		4,386.45
No. 6, Denton		4,965.00
No. 7, Spur		4,588.65
No. 8, Lubbock		6,788.44
No. 9, Balmorhea (Pecos)		4,726.86
No. 10, Feeding and Breeding Station		8,289.70
Dairy		1,510.50
Poultry		2,039.98
Swine		3,239.31
No. 11, Nacogdoches		4,428.03
No. 12, Chillicothe		4,487.91
No. 14, Sonora		11,795.19
Animal Industry (College)		2,698.36
BALANCE UNEXPENDED (Reverted to State Treasury)		287.22
TOTAL	$ 82,485.00	$ 82,485.00

	DEBIT	CREDIT
DIVISIONS:		
Received from State Treasurer	$115,500.00	$
Agronomy		2,599.89
Entomology		18,398.00
Plant Breeding		2,046.43
Horticulture		1,277.19
Veterinary Science		4,153.91
Plant Pathology and Physiology		1,146.19
Soil Survey		7,497.64
General		9,379.88
Animal Industry (College)		7,093.61
Publications		5,000.00
Salaries		42,350.00
Agronomy Farm		9,405.83
Reserve		5,000.00
BALANCE UNEXPENDED (Reverted to State Treasury)		151.34
TOTAL	$115,500.00	$115,500.00

SALES FUND

	DEBIT	CREDIT
SUBSTATION TREASURY:		
Received from sale of products	$ 57,320.89	$
Balance, August 31, 1922	1,541.88	
No. 1, Beeville		910.66
No. 2, Troup		480.45
No. 3, Angleton		642.13
No. 4, Beaumont		116.46
No. 5, Temple		750.69
No. 6, Denton		839.84
No. 7, Spur		
Agronomy		1,236.34
Animal Industry		7,447.18
No. 8, Lubbock		2,091.61
No. 9, Balmorhea (Pecos)		1,947.63
No. 10, Feeding and Breeding Station		3,368.65
Dairy		6,517.82
Poultry		2,723.04
Swine		3,084.17
No. 11, Nacogdoches		273.20
No. 12, Chillicothe		953.46
No. 14, Sonora		9,002.07
Wool Scouring Plant (from samples only)		5,526.46
Soil Survey		2,640.51
General (Administrative)		2,867.22
BALANCE		5,443.18
TOTAL	$ 58,862.77	$ 58,862.77

	DEBIT	CREDIT
MAIN STATION TREASURY:		
Received from sales	$ 15,402.10	$
Balance, August 31, 1922	2,127.69	
Agronomy		833.07
Entomology		100.94
Plant Breeding		12.00
Horticulture		217.42
Veterinary Science		1,101.81
Plant Pathology and Physiology		503.61
Photographic		954.91
Chemical Analyses		9,211.76
Experimental Apiaries		836.38
BALANCE		3,757.89
TOTAL	$ 17,529.79	$ 17,529.79

FEED CONTROL SERVICE

	DEBIT	CREDIT
RECEIPTS:		
Tax Collected (Inspection tax tags)	$ 93,247.32	$
DISBURSEMENTS:		
Salaries		19,172.25
Labor		1,195.75
Postage, stationery and office supplies		2,094.20
Freight and express		635.00
Travel (Feed Inspectors)		5,473.30
Furniture and fixtures		638.43
Tags		12,584.10
Tag refunds		791.89
Repairs and buildings		2.60
Publications		7,253.75
Analyses		12,000.00
NET SURPLUS		31,406.05
TOTAL	$ 93,247.32	$ 93,247.32

SUMMARY

	DEBIT	CREDIT
CONTROLLING ACCOUNT:		
Total Deposits with State Treasurer	$	$ 93,247.32
Disbursements (A. and M. College)	61,841.27	
NET SURPLUS	31,406.05	
TOTAL	$ 93,247.32	$ 93,247.32

INVENTORIES

	VALUE
SUBSTATIONS:	
No. 1, Beeville	$ 25,999.97
No. 2, Troup	34,425.40
No. 3, Angleton	21,179.55
No. 4, Beaumont	21,839.26
No. 5, Temple	28,789.77
No. 6, Denton	42,061.75
No. 7, Spur	43,365.95
No. 8, Lubbock	29,789.83
No. 9, Balmorhea (Pecos)	10,958.00
No. 10, Feeding and Breeding Station	67,651.76
Dairy	20,478.12
Poultry	8,210.60
Swine	8,850.44
No. 11, Nacogdoches	22,569.55
No. 12, Chillicothe	23,616.17
No. 14, Sonora	101,725.98
TOTAL	$511,512.10

	VALUE
DIVISIONS:	
Veterinary Science	$ 24,663.66
Chemistry	8,786.85
Horticulture	4,205.66
Animal Industry	20,258.99
Entomology	8,881.55
Agronomy	5,455.17
Plant Pathology and Physiology	5,315.53
Plant Breeding	3,257.11
Farm and Ranch Economics	304.17
Soil Survey	950.95
Photographic	1,258.85
Feed Control Service	2,967.43
Apiculture	9,533.30
Agronomy Farm	30,387.37
TOTAL	$166,820.24

TOTAL VALUE SUBSTATIONS INVENTORY	$511,512.10
TOTAL VALUE DIVISIONS INVENTORY	166,820.24
TOTAL VALUE ALL STATION PROPERTY	$678,332.34